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TACTICAL COMPUTERS

Army's Maneuver Control System Acquisition Plan Is Not Cost-effective

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United States
General Accounting Office
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Information Management and
Technology Division

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September 3, 1986

The Honorable Bill Chappell, Jr.
Chairman, Subcommittee on Defense
Committee on Appropriations
House of Representatives

The Honorable Ted Stevens
Chairman, Subcommittee on Defense
Committee on Appropriations
United States Senate

In response to your requests[1] for a review of the Army Command and Control System (ACCS) program, we are providing our analysis of the Army's computer equipment procurement and distribution plan for the Maneuver Control System (MCS), one of the five major control systems of ACCS. Also as requested, we plan to continue our review of computer acquisitions and system development efforts under the ACCS program in time for the subcommittees' work on the fiscal year (FY) 1988 Defense budget.

The Maneuver Control System is intended to provide the information commanders need to manage their forces on the battlefield. The Army proposes spending $223.6 million from FY 1986 through FY 1988 to complete the acquisition of interim computer equipment needed to field the Maneuver Control System for the U.S. Army active forces.

We initially provided you a fact sheet on the Army's plan in May 1986.[2] The enclosed briefing report gives detailed information on the status of the Maneuver Control System program, our analysis of the plan's compliance with congressional guidance, and the cost-effectiveness of the Army's computer equipment procurement and distribution plan for this program. In performing our review, we analyzed pertinent documents identifying the Maneuver Control System requirements, costs, development plans, and testing approach. In addition, we received briefings from and had interviews with officials responsible for the direction and support of the Maneuver Control System and ACCS programs.

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[1]Appendixes I and II contain the House Subcommittee's request letter, originally from former Chairman Addabbo, and the Senate Subcommittee's letter.

[2]Tactical Computers:Army's Maneuver Control System Procurement and Distribution Plan (GAO/IMTEC-86-21FS, May 23, 1986).

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We found that the Army's plan for the Maneuver Control System program does not comply with congressional guidance because the plan (1) provides for equipping 17 active divisions--rather than 11--with militarized[3] equipment, (2) calls for completing acquisition of ruggedized[4] equipment in FY 1988 instead of FY 1987, and (3) does not establish an aggressive test and evaluation program. We also found that the Army's proposed $223.6 million investment in interim MCS equipment includes overstated costs of over $47 million[5] for ruggedized equipment and $2.6 million more than is needed for militarized equipment acquisitions. More importantly, however, the plan is not the most cost-effective means of meeting the Army's maneuver control requirements because the interim militarized and ruggedized equipment is scheduled to be replaced with more capable equipment soon after its deployment to the active forces.

The Army intends to field interim MCS militarized and ruggedized equipment to Army active forces during FY 1988 and FY 1989 and to replace this equipment with new ACCS ruggedized equipment from FY 1990 through FY 1995. The new equipment will have greater processing capability than the interim equipment, but it will not be as survivable in an adverse operating environment as the interim equipment. Although the Army has not developed a final schedule for replacing interim equipment, if it follows the current plans, the interim equipment will be used for active and reserve forces for 5 to 7 years, at most. However, the ACCS Deputy Program Director believes the Army may be able to accelerate the deployment of the new equipment so that interim equipment would be used for only about 2 years.

We recommend that the Secretary of the Army, before acquiring any additional interim militarized or ruggedized equipment for the MCS, demonstrate to the Congress that such interim acquisitions are cost-effective and consistent with the Army's plans to provide common computer equipment and software for primary tactical command and control systems in the active forces and ultimately for the reserve forces.

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[3]Militarized equipment has been specifically designed and custom-built for military use to operate under adverse conditions.

[4]"Ruggedized" means that equipment has been adapted to enhance its capabilities in a stressful environment. Ruggedized equipment is often less tolerant of adverse operating conditions than militarized equipment.

[5]Army officials have subsequently told us that the difference is only $34 million because of errors in the contractor's price proposal. The Army has not confirmed this revised estimate in writing, and we have not verified its accuracy.

We have discussed the facts in this report with Army officials and have incorporated their comments where appropriate. However, we did not obtain agency comments on a draft of this document. We are providing copies of this report to the Secretary of Defense and the Secretary of the Army. We will make copies available to others on request.

Should you need additional information or have any questions on the contents of this document, please call Dr. Carl Palmer, the Associate Director responsible for this work, on 275-4649.

Warren G. Reed
Director

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ABBREVIATIONS

AC	analyst console
ACCS	Army Command and Control System
BMD	bubble memory device
FY	fiscal year
MCS	Maneuver Control System
NDI	nondevelopment item
TCP	Tactical Computer Processor
TCS	Tactical Computer System
TCT	Tactical Computer Terminal

INTRODUCTION

The Army has been trying for over 25 years to automate tactical command and control operations. One such effort is the Maneuver Control System (MCS) program, which is intended to provide automated battlefield information for commanders and their staffs at corps, division, brigade, and battalion echelons. Originally, the Army planned to field the Maneuver Control System with unique militarized computer equipment exclusively. However, the Army now plans to field the Maneuver Control System with a combination of unique militarized and nondevelopmental item (NDI)[6] commercial computer equipment. The NDI commercial computer equipment would be packaged (ruggedized) in order to improve its ability to operate in a stressful environment.

Because of concerns about the high cost of the Maneuver Control System program, the defense subcommittees of the House and Senate Appropriations Committees, in the December 19, 1985, Defense Appropriations Conference Report 99-450, directed the Army to provide a revised Maneuver Control System computer equipment procurement and distribution plan (see appendix III). In March 1986, the Assistant Secretary of the Army (Research, Development and Acquisition) submitted a report detailing the Army's computer equipment procurement and distribution plan for the Maneuver Control System (see appendix IV).

At the request of the chairmen of the defense subcommittees of the House and Senate Appropriations Committees, we reviewed the Army's MCS computer equipment procurement and distribution plan. In May 1986, we issued a report[7] presenting the facts that we had assembled during our review. We also met with the Under Secretary of the Army and other Army officials to confirm our facts, discuss our concerns about the Army's plan, and obtain the Army's reaction to our findings and observations. On June 6, 1986, the Army delineated its position regarding the major issues discussed in our report (see appendix V).

In performing our current review, we analyzed pertinent documents identifying the Maneuver Control System requirements, costs, development plans, and testing approach. In addition, we received briefings from and had interviews with officials responsible for the direction and support of the Maneuver Control System and ACCS programs, including officials from the United States Combined Arms Center Development Activity; the Fort Leavenworth, Kansas, Army software development center; the

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[6]A nondevelopmental item is an existing unit of equipment.

[7]Tactical Computers: Army's Maneuver Control System Procurement and Distribution Plan (GAO/IMTEC-86-21FS, May 23, 1986).

Maneuver Control System project manager's office; the ACCS program office; the United States Army Communications and Electronics Command; and the Maneuver Control System integration contractor. We also interviewed the Army headquarters officials responsible for oversight of the Maneuver Control System program and for force deployment planning. We have incorporated Army comments on our earlier fact sheet where appropriate into this report.

MANEUVER CONTROL SYSTEM PROGRAM STATUS

In 1980, the Army selected militarized computer equipment to support the maneuver control function and began the evolutionary development of the Maneuver Control System. In order to better meet user needs and reduce program costs, the program has undergone frequent major changes to system requirements and planned supporting automated systems. These changes have contributed to the program's falling over 3 years behind schedule. The Army expects to begin providing maneuver control militarized equipment to the active forces in September 1986 and ruggedized equipment in the first quarter of fiscal year (FY) 1988. In addition, Army plans call for the continuing implementation of maneuver control software enhancements at regular intervals of approximately 1 year following initial fielding to the active forces. The following summarizes key events of the Maneuver Control System program.

Key Maneuver Control System program events

1980 With the termination of the Tactical Operation System program, the Tactical Computer System (TCS) and the Tactical Computer Terminal (TCT) were selected as the militarized equipment to support the Maneuver Control System.

1983 The Army approved the Maneuver Control System for production but required major system changes including

- --upgrading the TCS (communications module) and TCT (from an 8-bit to a 16-bit processor),
- --developing MCS software using the Ada programming language,
- --procuring less expensive and more capable ruggedized NDI equipment as a substitute for militarized equipment, and
- --redefining the battalion maneuver control equipment requirements (because the TCT did not meet battalion needs).

1984 The Hewlett-Packard 9920U 16-bit microprocessor was selected as the NDI substitute (termed the Tactical Computer Processor (TCP)) for the TCT.

1985 Maneuver Control System fielding was delayed due to software development problems and failure of the TCS and TCT to pass first article testing.

The Army developer of Maneuver Control System requirements requested major system changes including the addition of local area networking and staff data processing capabilities.

Defense Appropriations Conference Report 99-450 directed the Army to provide a revised MCS computer equipment procurement and distribution plan by March 1986.

1986 Major changes were made to the Maneuver Control System program.

--The TCS was deleted because it did not meet user needs. This action resulted in the expenditure of $26 million for equipment and software that will not be deployed to the forces.

--To enhance MCS computer processing capability, the TCP was changed from the 16-bit Hewlett-Packard 9920U microprocessor to the 32-bit Hewlett-Packard 320 microprocessor.

--A ruggedized analyst console (AC) (the Hewlett-Packard 310 microprocessor) was added to the TCP configuration.

The Army decided to delay fielding the battalion maneuver control equipment until such equipment became available through the Army Command and Control System (ACCS) program.[8] Placing computer equipment at the battalion echelon was assessed by the Army to be a major portion (54 percent) of the completed system's total automation. The

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[8]The ACCS program is intended to acquire and field an affordable, effective, and interoperable common family of militarized, ruggedized, and standard commercial computer equipment with software to support the requirements of the Army's primary tactical command and control systems (maneuver control, air defense, fire support, intelligence/electronic warfare, and combat service support).

January 22, 1986, Army command cost estimate for the Maneuver Control System program indicates a total requirement of $120 million for the procurement of battalion echelon computer equipment.

The Assistant Secretary of the Army (Research, Development and Acquisition) submitted a report on March 5, 1986, to the Chairman, Subcommittee on Defense, Committee on Appropriations, House of Representatives, on the proposed procurement and distribution plan for the MCS militarized and ruggedized equipment. The report stated that $223.6 million would be required to implement the following procurement plan to complete the equipment acquisitions needed to field the Maneuver Control System for the United States Army active forces.

Table 1:
MCS Equipment Procurement Plan Summary

	FY'86	FY'87	FY'88	Total
TCT/BMD Militarized	32	--	--	**32**
TCT Militarized	74	--	--	**74**
TCP Ruggedized	28	187	352	**567**
AC Ruggedized	40	362	677	**1,079**
Funding (Millions)	$56.7	$56.9	$110	**$223.6**

Tests are underway for a militarized hard disk to provide expanded secondary storage capacity (50 million bytes versus the 8 million bytes of the TCT's bubble memory device (BMD)) at less than 15 percent of the cost of the BMD the Army plans to acquire. However, Army officials indicate that the procurement of additional BMDs will not be delayed to await the results of the militarized hard disk tests.

Contract negotiations for the acquisition of the additional TCT and BMD militarized computer equipment planned for acquisition in FY 1986 have been completed; the Army anticipates that the contract will be signed in August 1986.

The Army plans to begin fielding already acquired TCT and BMD militarized equipment with Version 9 MCS software in September 1986.

THE ARMY'S PLAN IS NOT CONSISTENT WITH CONGRESSIONAL GUIDANCE

The Army's plan does not comply with congressional guidance for the Maneuver Control System program because it

--provides for equipping 17 active divisions--rather than 11--with militarized equipment,

--calls for completing acquisition of ruggedized equipment in FY 1988 instead of FY 1987, and

--does not establish an aggressive test and evaluation program for the Maneuver Control System.

The Army's plan provides for equipping 17 active divisions with militarized equipment

Congressional guidance directed that the deployment of militarized equipment be limited to the training base, forward deployed, and early deploying active forces for the European, Korean, and Southwestern Asian theaters. The congressional staff that had developed the congressional guidance for the Maneuver Control System program in Defense Appropriations Conference Report 99-450 indicated that the guidance was developed under the assumption that only 11 of the 18 active Army divisions were considered forward deployed or early deploying. However, the Army plan would equip the training base and 17 divisions with both militarized and ruggedized equipment. The plan also would equip 5 corps, 3 air cavalry regiments, and 5 separate brigades. One division, the 6th infantry division stationed in Alaska, would be equipped entirely with ruggedized equipment because its current mission does not require deployment to the European, Korean, or Southwestern Asian theaters.

The Army believes that there is a need to field 17 active Army divisions with militarized equipment because the Maneuver Control System is a "go-to-war" system, not merely a training vehicle to prepare for the introduction of ACCS equipment. We have not evaluated the Army's need to equip 17 rather than 11 active divisions with militarized equipment. However, we have assessed the cost impact of fielding militarized equipment for 11 rather than 17 divisions.

If the training base, corps, separate brigades, air cavalry regiments, and 11 divisions were equipped with a mix of militarized and ruggedized equipment and the other 7 divisions received the ruggedized equipment configuration specified in the Army's plan for the 6th infantry division, the estimated cost for militarized equipment could be reduced from $48.4 million to

$24.5 million, for an estimated program cost reduction of $23.9 million.

Table 2:
Estimated Cost Reduction (in Thousands) If 11--Rather Than 17--Divisions Receive MCS Militarized Equipment

		Army Plan Procurements [b]		Revised Procurements	
Device	Unit Cost [a]	Qty	Cost	Qty	Cost
TCT/BMD	$630	23	$14,490	11	$ 6,930
TCT	$390	87	$33,930	45	$17,550
Total			**$48,420**		**$24,480**

Estimated Reduction = $23,940

[a]Unit costs are based on current contract quantities; different unit costs may result from changes in purchase quantities. (The Army estimates that savings would be $19.6 million rather than $23.9 million due to increases in unit costs resulting from reductions in purchase quantities.)

[b]These procurement quantities are based on revised Army information concerning the quantities of MCS militarized equipment previously acquired.

Procurement of ruggedized equipment planned for completion in FY 1988

The defense subcommittees of the House and Senate Appropriations Committees directed the Army to complete the procurement of ruggedized equipment in FY 1987. However, procurement of ruggedized equipment is planned for FY 1986 through FY 1988. According to the Army, ruggedized equipment procurement will not be completed in FY 1987 due to funding limitations and the time required for equipment production.

An aggressive test and evaluation program has not been established

Although congressional guidance directed the Army to establish an aggressive test and evaluation program for the Maneuver Control System, there is no approved test program for this system. Army officials indicate that a formal test and evaluation master plan will be completed during the summer of 1986. However, draft plans and Army officials indicate that the Army plans to commit to full production of MCS militarized equipment prior to formal operational testing. Not conducting operational tests before committing to full production increases the risk of acquiring a system that does not meet user needs.

Both Department of Defense and Army regulations and guidance (Defense Acquisition Circular Number 76-43, Department of Defense Directive Number 5000.3, and Army Regulation 70-1) direct that a complete prototype system, including software, be built to production specifications and subjected to final developmental and operational testing before the Army makes a production commitment. Past GAO reports[9] have also stressed the need for adequate operational testing before committing to production.

The Army plans to make a commitment in the fourth quarter of FY 1986 to complete the production of interim MCS militarized equipment. The acquisition of ruggedized equipment would be phased from FY 1986 through FY 1988 with a low rate of initial production. However, while the Army plans to conduct limited equipment and software tests during 1986 and 1987, it does not plan to perform a full system field operational evaluation of interim production equipment and software until the second quarter of FY 1988.

Army officials indicated that formal operational testing of production models of interim MCS militarized equipment prior to full production is unnecessary because of operational evaluations of earlier versions of this equipment. Also, Army officials stated that a field operational evaluation of the interim militarized equipment would be successfully performed before this equipment is fielded to the active forces. On the other hand, ruggedized equipment planned for acquisition in FY 1987 would only be acquired if the results of a FY 1986 operational assessment justified this acquisition. The planned FY 1988 acquisition of ruggedized equipment would also depend upon the successful completion of a field operational evaluation planned for earlier in that year.

The Army's acquisition approach for ruggedized computer equipment limits risk because it avoids a full commitment to production prior to operational testing. However, the Army's plan to commit to the full production of militarized computer equipment before a prototype of the total system has successfully completed operational testing increases the risk of acquiring a system that does not meet user needs. For example, The Army committed to the production of the militarized TCS before performing operational testing. The Army later decided that this equipment did not meet user needs. As a result the Army spent $26 million for equipment and software that will not be deployed to the forces.

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[9] Tactical Operations System Development Program Should Not Continue As Planned (LCD-80-17, November 20, 1979) and Production of Some Major Weapon Systems Begin With Only Limited Operational Test And Evaluation Results (GAO/NSIAD-85-68, June 9, 1985).

PROGRAM COSTS CITED IN THE ARMY'S PLAN ARE OVERSTATED

The Army's plan proposes spending $223.6 million from FY 1986 through FY 1988 for militarized and ruggedized equipment. This irvestment in interim MCS equipment is overstated by over $47 million for ruggedized equipment and includes $2.6 million more than is needed for militarized equipment.

Overstated equipment costs in the Army plan corrected by over $47 million

In April 1986, we met with Army project management and contracting officials to discuss the cost specified in the Army plan for ruggedized equipment (TCPs and ACs) because it differed from the cost patterns for similar procurements and costing information received from the Maneuver Control System integration contractor. The Army project manager for the acquisition of ruggedized TCPs and ACs provided corrected unit costs, resulting in a revised cost estimate of $127 million--a $47 million reduction of the Army plan's cost estimate of $174 million for this equipment. In June 1986, the Army officially concurred that the current cost estimate is $47 million less than that stated in the MCS computer equipment procurement and distribution plan (see appendix V).[10]

Table 3:
Impact of Unit Cost Corrections on the Cost of TCPs and ACs

Device	FY	Qty	Army Estimated Unit Costs		Estimated Reduction
			Plan	Corrected	
TCP	1986	28	$211,000	$179,700	$ 876,400
TCP	1987	187	$219,000	$179,700	7,349,100
TCP	1988	352	$226,000	$140,200	30,201,600
AC	1986	40	$ 43,000	$ 38,700	172,000
AC	1987	362	$ 44,000	$ 38,700	1,918,600
AC	1988	677	$ 45,000	$ 35,300	6,566,900
Total Reduction					**$47,084,600**

[10]Army officials have subsequently told us that the difference is only $34 million because of errors in the contractor's price proposal. The Army has not confirmed this revised estimate in writing, and we have not verified its accuracy.

The Army's plan provides $2.6 million more than is needed for the acquisition of militarized equipment

Table 4 identifies the quantities of interim MCS militarized and ruggedized equipment already acquired and the additional equipment acquisitions that are needed.

Table 4:
Militarized Equipment Needed to Fulfill the Army's Requirements

	Equipment Units	
	TCT/BMD	TCT
Army Requirements [a]	54	152
Prior Acquisitions [b]	31	65
Need to Acquire	23	87

[a]Based on the Army's March 7, 1986, MCS equipment distribution plan.

[b]The cost of these acquisitions was $80.2 million.

From our discussions with Army officials concerning the quantities of militarized equipment needed to field the Maneuver Control System and the quantities of equipment available from prior acquisitions, we determined that the quantities of militarized equipment proposed for acquisition in the Army's plan were incorrect. Based on these discussions it appears the Army's plan includes $2.6 million more than is required for the acquisition of interim MCS militarized equipment. Table 5 indicates the quantities of interim militarized equipment proposed in the Army's plan and the revised equipment acquisition requirements based on information provided by the Maneuver Control System project manager.

Table 5:
Revised MCS Equipment Acquisition Requirements

	Army Plan	Need to Acquire	Difference	Value in Millions
TCT/BMD	32	23	-9	($5.7)
TCT	74	87	+13	$5.1
Carryover Equipment			minus [a]	($2.0)
Total				($2.6)

[a]Previously purchased printers (23) and power supplies (23) for the recently canceled TCS that can be used for the TCT.

THE ARMY MCS PLAN IS NOT COST-EFFECTIVE

Although the Army maintains that there is an urgent need for an automated maneuver control capability and plans to field the Maneuver Control System using interim equipment, this planned investment of $223.6 million does not appear to be cost-effective because

--ACCS equipment specifications bring into question the Army's need for equipment with the processing and survivability capabilities of the interim MCS equipment, and

--MCS equipment planned for acquisition would be replaced soon after fielding with ACCS equipment. Thus, it would be used significantly less than the 20-year equipment life called for in the Army's required operational capabilities statement for the Maneuver Control System.

If the Army needs an automated maneuver control capability before ACCS equipment is available, an interim system composed of only militarized equipment would, according to Army officials, be capable of supporting all critical maneuver control functions. Therefore, at a minimum, Army's planned $127 million investment in interim ruggedized equipment does not appear to be necessary.

ACCS equipment specifications bring into question Army's need for interim MCS equipment

The new ACCS program will provide ruggedized equipment to replace both interim MCS militarized and ruggedized equipment. Based on the Army's specifications for the new and interim equipment, the ACCS ruggedized equipment would have greater processing capabilities. For example, the new ruggedized computers would have about twice the instruction processing rate of the interim equipment. With the exception of being able to withstand the vibration of tracked vehicles, the new ruggedized equipment would not be required to be as survivable in an adverse operating environment as the interim militarized or ruggedized equipment. For example, unlike the militarized TCT, the new ACCS ruggedized equipment would not be required to operate in a nuclear environment. The new ruggedized equipment would also have less stringent environmental requirements than the interim ruggedized equipment, such as a more limited operating temperature range.

According to Army officials, interim MCS militarized equipment lacks the processing capability to support the increased functions of Version 10 software (scheduled for FY 1987). The interim militarized equipment would also be

expensive to upgrade. For example, Army officials estimated that the expansion of main memory on the militarized TCT from 1 million to 4 million bytes, needed to fully support the increased capabilities of Version 11 software in 1988, would take 18 months and cost at least $10 million.

Since the new ACCS ruggedized equipment processing and survivability capabilities reflect the Army's requirements for the ultimate automation of maneuver control and other primary tactical command and control systems, the differences in capabilities between ACCS and MCS equipment bring into question the Army's need to acquire equipment with the capabilities of interim equipment.

MCS equipment would be replaced soon after fielding with ACCS equipment

The Army's MCS plan provides for the acquisition of militarized and ruggedized equipment from FY 1986 through FY 1988 and the fielding of this equipment to the active forces during FY 1988 and FY 1989. Army officials indicate that new ACCS equipment will replace the interim MCS militarized and ruggedized equipment from FY 1990 through FY 1995. According to current plans, as the interim equipment is replaced in the active forces by new ruggedized equipment, about two-thirds of the interim equipment will be redeployed to the reserve forces and later replaced with the new equipment. While the Army has not developed an official schedule for the replacement, redeployment, and final phaseout of interim equipment, if it follows its current plan, it appears that the interim equipment would be used for active and reserve forces for 5 to 7 years, at most. However, Army officials indicated that this plan will be reviewed prior to MCS equipment redeployment to ensure that this is the most cost-effective alternative for equipping the Army reserve forces. If redeploying interim equipment is not the best alternative for the reserve forces, the Army's use of interim equipment planned for acquisition could be limited to the period of fielding with the active forces (possibly about 2 years).

The ACCS Deputy Program Manager anticipates that the successful contractor for new ACCS equipment will be a large equipment manufacturer capable of easily meeting expanded Army equipment requirements. He believes that the new equipment required to support maneuver control requirements could be produced within a year of type classification and that installation of that new equipment could be accelerated to within 2 years of interim MCS ruggedized equipment fielding as shown in table 6.

Table 6:
Accelerated Fielding of ACCS Equipment for the Maneuver Control System

	FY'86	FY'87	FY'88	FY'89	FY'90	FY'91
MCS TCT	4QTR-----1QTR [a]		1QTR-----1QTR			
MCS TCP			1QTR-----4QTR			
ACCS		[b]		[c]	1QTR-----4QTR	

[a]There is a 1-year break in the schedule because of the time required to produce and field the militarized equipment the Army plans to order in FY 1986.

[b]ACCS equipment is scheduled to be selected and type classified by the fourth quarter of FY 1987.

[c]The 2-year interval between ACCS equipment type classification and its fielding in the first quarter of FY 1990 is an estimate based on the Maneuver Control System project manager's assessment of the time required to modify and test MCS software and begin ACCS equipment fielding.

The Maneuver Control System project manager indicated that 19 to 27 months would be required for

--modification of MCS software for operation with ACCS equipment and software (6 to 9 months),

--software testing (3 months),

--operational testing (4 to 6 months),

--fielding approval (4 to 6 months), and

--equipment shipping (2 to 3 months).

If these activities are completed in the minimum times indicated, new ACCS equipment for maneuver control could be initially fielded during the second quarter of FY 1989--about 1.5 years after the interim MCS equipment proposed for acquisition is scheduled for fielding. However, assuming an average between minimum and maximum estimates for these activities of about 2 years and the same 2-year fielding pattern used for interim ruggedized equipment, ACCS equipment could be fielded during FY 1990 and FY 1991 rather than the planned FY 1990 through FY 1995 timeframe.

Based on the ACCS Deputy Program Manager's assessment that the Army could be able to increase the production quantities of new ACCS equipment, adequate quantities of new equipment could

also be available for reserve forces in the same timeframe planned for the redeployment of interim MCS equipment. Using new equipment rather than redeployed interim equipment could minimize the fielding delay to the reserve forces and avoid the need to later replace the interim equipment with ACCS equipment. Also, the use of new equipment for active and reserve forces would avoid maintaining two versions of the Maneuver Control System and would be consistent with the Army's objective of fielding common computer equipment and software for its primary tactical command and control systems.

If the Army needs an interim MCS, acquisition of MCS ruggedized equipment still would not appear to be necessary

The Army believes that it is a cost-effective investment to field the interim MCS militarized and ruggedized equipment until new ACCS equipment is available. However, we question the necessity of automating noncritical functions with interim ruggedized equipment before ACCS equipment is available. The Army's planned investment of $127 million for interim ruggedized equipment--most of which (76 percent) would be fielded during FY 1989--does not appear to be cost-effective considering the Army's

- --assessment that interim militarized equipment can perform all critical maneuver control functions and
- --ability to field new ACCS equipment--possibly beginning in FY 1989--within about 2 years of the interim ruggedized equipment fielding.

The interim ruggedized equipment is intended to provide the ability to support all maneuver control functions. Although the interim militarized equipment lacks the ability to support noncritical maneuver control capabilities, Army officials indicated it has the capability without upgrades to support all critical maneuver control functions. The Army has indicated that interim ruggedized equipment has adequate processing capability to permit the elimination of interim militarized equipment without replacement. The Army also maintains that the militarized equipment is needed because the ruggedized equipment does not have the survivability required to ensure support of the commander's ability to maneuver the force under adverse operating conditions.

The Army has already acquired approximately one-half of the interim MCS militarized equipment required to field the forward deployed and early deploying active forces. Based on the Army's plan, an additional investment of about $48 million would be required to complete the acquisition of interim militarized equipment for these active forces. On the other hand, the Army

has not begun acquiring the ruggedized equipment. Deferring the automation of noncritical maneuver control functions with ruggedized equipment and delaying the fielding of interim equipment for the 6th infantry division until ACCS equipment is available would reduce program cost by $127 million.

CONCLUSIONS

We question whether the Army's planned investment of $223.6 million for interim MCS militarized and ruggedized equipment is cost-effective for the following reasons.

- --The interim equipment will be used for 5 to 7 years, at most, for active and reserve forces before it would be replaced by ACCS equipment. This is significantly less than the 20-year equipment life called for in the Army's required operational capabilities statement for the Maneuver Control System.

- --The new ACCS equipment will have different processing and survivability capabilities than the interim equipment.

- --The decision to deploy different equipment--interim MCS and new ACCS--is inconsistent with the Army's objective to provide common computer equipment and software for the primary tactical command and control systems for active and reserve forces and would require the maintenance of two versions of the Maneuver Control System.

- --It is possible to accelerate the fielding of ACCS equipment and thus limit the delay in fielding the Maneuver Control System to the active forces to about 2 years.

Considering these factors, we believe it is worth delaying the fielding of the Maneuver Control System until ACCS equipment is available, thus achieving an estimated program reduction of $223.6 million by not acquiring interim militarized and ruggedized equipment.

If the Army has needs that preclude the delay in fielding the Maneuver Control System until ACCS equipment is available, the cost-effectiveness of a $127 million investment in interim ruggedized equipment is still questionable. We maintain this position because the Army indicates that the interim militarized equipment can perform all critical maneuver control functions.

The Army's commitment to the full production of militarized equipment before a prototype of the total Maneuver Control System has successfully completed operational testing increases the risk of acquiring a system that does not meet user needs. The Army followed this approach for the militarized TCS, which resulted in

the expenditure of over $26 million in equipment and software that will not be deployed to the forces.

RECOMMENDATIONS

We recommend that the Secretary of the Army, before acquiring any additional MCS militarized or ruggedized equipment, demonstrate to the Congress that such interim acquisitions are cost-effective and consistent with the Army's objective to provide common computer equipment and software for primary tactical command and control systems in both reserve and active forces. The Army should particularly address

- --the cost-effectiveness of the $223.6 million expenditure on interim MCS equipment, particularly given the possibility that the Army can field ACCS ruggedized equipment for the Maneuver Control System shortly after fielding the interim equipment under planned or accelerated schedules;

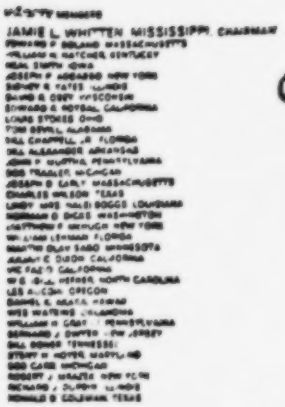
- --the Army's need for the interim militarized and ruggedized equipment in view of the differences in processing and survivability capabilities between this equipment and the replacement ACCS equipment; and

- --the cost-effectiveness of the Army's plan to field and maintain different versions of the Maneuver Control System for reserve and active forces, and its inconsistency with the Army's objective to provide common computer equipment and software for primary tactical command and control systems.

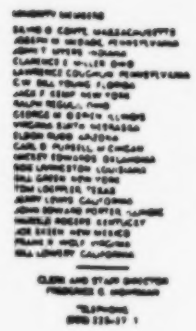
If the Army's critical needs prove to be so urgent that the fielding of the Maneuver Control System cannot be delayed until ACCS equipment is available, we recommend that the Army acquire only interim militarized equipment in the quantities specified in its plan. On the basis of Army assessments, we believe that this equipment will be capable of supporting all critical maneuver control functions until ACCS equipment is available.

If acquisition of such interim equipment is warranted, we further recommend that the Army successfully complete an operational test of the production system (both computer equipment and software) before making a full production commitment.

APPENDIX I



Congress of the United States
House of Representatives
Committee on Appropriations
Washington, DC 20515



January 28, 1986

Honorable Charles A. Bowsher
Comptroller General of the United States
General Accounting Office
Washington, D. C. 20548

Dear Mr. Bowsher:

As part of the Subcommittee's oversight of the Department of Defense's programs, I am asking the General Accounting Office to conduct a review of the Army's plan to put in place a command, control, and communications network to satisfy the needs of battlefield commanders in the 1990's and beyond. The significance of this network lies both in its cost, which is estimated in the billions of dollars over its life cycle, and in its role as a command and control system which will help manage substantial amounts of combat resources, including personnel and weapons. Implementation of the Army's plan is especially important to ensure success of the recently approved Airland Battle doctrine which emphasizes maneuverability and close coordination of all elements of combat power.

The Subcommittee's primary objective is to gain an understanding of the program which will eventually place a vast number of computers, terminals, radios, and other devices on the battlefield. Of particular concern is the Army's plan for using new communications systems such as Mobile Subscriber Equipment (MSE) and SINCGARS, to tie together the computers that will help manage the battle. Several key issues which I would like GAO to address are as follows.

-- What are the performance, schedule, and cost goals of the major components of the Army's Command and Control System (ACCS) architecture?

-- Are the development and acquisition of the ACCS subsystems adequately coordinated to provide standard, interoperable hardware and software components such as computers, work stations, displays, and communications facilities?

-- Do the communications systems being purchased by the Army have adequate capacity and interoperability to support intelligence, air defense, fire support, maneuver, and combat service support?

APPENDIX I

-- What is the status of the acquisition and fielding of those communications systems, particularly with respect to development problems, frequency considerations in their deployment areas, and their ability to operate with current U.S. assets and allied systems?

-- Does the Army have a cost effective acquisition approach making maximum use of off-the-shelf equipment and consolidated purchases to achieve unit cost reductions?

-- Are the Army and other Services recognizing and exploiting opportunities for common communications equipment such as switches and radios for ground combat?

-- What hardware components will be used for the ACCS air defense subsystem? Will they contain adequate sensor, processing, and communications capability to provide key information about targets to the gunners in sufficient time to capitalize on the advanced capabilities of weapons such as Stinger, Chapparal, and Patriot?

-- Does the ACCS computer program provide a sound approach for identifying and acquiring a common family of computer equipment and software for Army command and control systems?

-- Have ACCS computer program equipment and software requirements been defined with adequate consideration to the various processing requirements of Army command and control systems? How was the mix of militarized, ruggedized and commercial equipment planned for acquisition established and are the militarized components specified the minimum essential?

-- What impact has the ACCS computer program had on current Army command and control system development efforts? Are current development efforts and the ACCS computer program consistent and well coordinated, or are changes in these efforts needed?

-- Does the Army's revised maneuver control system computer equipment procurement and distribution plan comply with guidance in the fiscal year 1986 Department of Defense Appropriations Conference Report? Does the Army's plan provide a sound approach and economical solution, particularly considering planned equipment replacements under the ACCS computer program, for meeting the Army's stated requirements?

The GAO recently assisted the Subcommittee on issues relating to the multibillion dollar MSE program. Since MSE is a key element in the Army's command and control architecture, I would like GAO to continue reviewing this program and advise the Subcommittee staff in preparation for the fiscal year 1987 budget process.

APPENDIX I

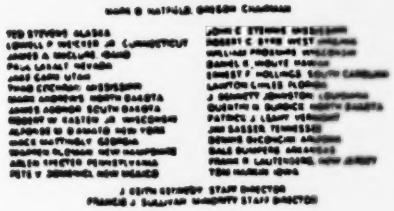
Due to the comprehensive nature of this request and the short timeframes allowed for our fiscal year 1987 appropriations work, I believe a two phased approach might be most beneficial to the Subcommittee. In the first phase, GAO could provide interim findings that have impact on the fiscal year 1987 appropriations request. The second phase would permit GAO to investigate the issues in greater depth and provide its results in time for the fiscal year 1988 budget process. As your review proceeds, I would encourage your staff to provide verbal or other informal briefings to the Subcommittee on an ad-hoc basis. Your staff should contact Mr. Bruce Meredith of the Subcommittee staff as soon as possible to arrange the work necessary to carry out my request.

With best wishes,

Sincerely,

Joseph P. Addabbo
Chairman
Subcommittee on Defense

APPENDIX II



United States Senate

COMMITTEE ON APPROPRIATIONS
WASHINGTON, DC 20510

February 5, 1986

The Honorable Charles A. Bowsher
Comptroller General of the United States
U.S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Bowsher:

As part of the Subcommittee's oversight of Department of Defense programs, I would like the General Accounting Office to review the Army's plan to put in place a command, control, and communications network to satisfy the needs of battlefield commanders in the 1990's and beyond. Implementation of this multi-billion dollar plan is essential to the success of the recently approved Airland Battle doctrine.

The Subcommittee's primary objective is to gain an understanding of the costs, schedule and risks of this program which will eventually place large amounts of software and a vast number of computers, terminals, radios, and other devices on the battlefield. Of particular concern is the Army's plan for using new communications systems such as Mobile Subscriber Equipment, the Army Data Distribution Systems or PJH, and SINCGARS, to tie together the computers that will help manage the battle.

On a related matter, the GAO recently assisted the Subcommittee on the Army's MSE program. Since MSE is a key element in the Army's command and control architecture, I would like GAO to continue monitoring this program and advise the Subcommittee staff in preparation for the fiscal year 1987 budget process.

Due to the comprehensive nature of this request and the limited time available for our fiscal year 1987 appropriations work, I believe a two phased approach might be beneficial. First, provide interim findings that have impact on the fiscal year 1987 appropriations request. The second phase would permit you to investigate the issues in greater depth and provide results in time for the fiscal year 1988 budget process. As your review proceeds, I would like your staff to contact Mr. Richard Ladd of the Subcommittee staff.

With best wishes.

Cordially,

TED STEVENS
Chairman
Subcommittee on Defense

APPENDIX III

99TH CONGRESS 1st Session | HOUSE OF REPRESENTATIVES | REPORT 99-450

HOUSE JOINT RESOLUTION 465, FURTHER CONTINUING APPROPRIATIONS FOR FISCAL YEAR 1986

DECEMBER 19, 1985.—Ordered to be printed

Mr. WHITTEN, from the committee of conference, submitted the following

CONFERENCE REPORT

[To accompany H.J. Res. 465]

MANEUVER CONTROL SYSTEM

The conferees recommend $60,000,000 for the Maneuver Control System (MCS). The conferees are concerned about the relatively high cost of military standard equipment and direct that provision of military standard equipment be limited to the training base and to the forward deployed and early deploying active component forces for the European, Korean, and Southwestern Asian Theaters. The conferees intend that (1) military standard equipment for these forces will be supplemented with nondevelopmental (NDI) equipment, (2) other active forces will be equipped entirely with NDI equipment, and (3) military standard equipment will be redistributed to the reserve component forces when the active forces are re-equipped under the Army Command and Control System (ACCS) program. The conferees direct that, to achieve greatest economy, priority should be given to acquiring the remaining military standard equipment in fiscal year 1986. For the remainder of the program equipment, procedures should be established to ensure that procurement and the ability to field this equipment is synchronized.

The conferees direct the Army to report to the Defense Appropriations Subcommittees of the House and Senate prior to obligation, but no later than March 1, 1986, on its proposed procurement and distribution plans of both military standard and NDI equipment for this program.

The conferees are aware that the MCS program has been developed and tested on an evolutionary basis and intend that the continuing development of the MCS will provide critical learning experience for the follow-on ACCS program. The conferees therefore direct that procurement be planned for completion in fiscal year 1987 and that fielding of this equipment be done expeditiously. An aggressive test and evaluation program should be established to ensure maximum transfer of MCS experience to the follow-on ACCS program. The success of this program is of interest to the conferees. Reports on its status should therefore be made from time to time to the Defense Appropriations Subcommittees of the House and Senate.

BEST COPY AVAILABLE

APPENDIX IV

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, D.C. 20310

5 MAR 1986

Honorable Joseph P. Addabbo
Chairman
Subcommittee on Defense
Committee on Appropriations
House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

House of Representatives Report 99-450 requested that the Army provide the Committee with a report on the proposed procurement and distribution plans for both the military standard and NDI equipment for the Maneuver Control System (MCS) program.

Enclosed is the Army's report detailing the procurement and distribution plans for this system. In order to comply with Congressional guidance to complete procurement of the military standard equipment in FY 1986, and to minimize costs associated with this program, the Army will procure no additional Tactical Computer Systems (TCS), but, will procure in their place the Tactical Computer Terminal (TCT) with a bubble memory.

We believe the rapid fielding of the MCS system described in the report will provide important lessons to support the ACCS program. A vigorous test and evaluation program is being established to ensure lessons learned with MCS are transferred to the ACCS program.

I hope this information will prove useful in your future budget deliberations.

Sincerely,

J.R. Sculley
Assistant Secretary of the Army
(Research, Development and Acquisition)

Enclosure

APPENDIX IV

REPORT ON THE MANUEVER CONTROL SYSTEM (MCS)

1. This report responds to the Congressional direction that the Army report on the procurement and distribution plans for the Maneuver Control System by March 1, 1986.

2. The Army has reviewed the MCS program in light of the Congressional guidance and the recently approved Operational and Organizational (O&O) plan for the MCS system. Based on this review, the procurement plan has been revised to complete procurement of military standard equipment with FY86 funds. FY87 and FY88 funds will be used entirely to buy-out and rapidly field the Non-developmental Item (NDI) equipment for the MCS by the end of FY 1989.

MCS Procurement Plan

	FY86	FY87	FY88
Tactical Computer Terminal with Bubble Memory (TCT w/B)	32		
Tactical Computer Terminal (TCT)	74		
Tactical Computer Processor (TCP)	28	187	352
Analyst Console (AC)	40	362	677
Funding ($ in millions)	56.7[1]	56.9	110.0[2]

[1] Reflects Gramm-Rudman reduction of $3.3 million from FY86 Congressional Appropriation of $60.0M.

[2] The Army plans to adjust the FY88-92 POM to fund this amount to complete Non-developmental Item (NDI) procurement in FY88.

3. The revised MCS O&O plan provides staff processing capability through the use of TCPs and ACs at the main and tactical command posts at Corps through Brigade levels. The substitution of a group of TCPs with their 2 communications channel capability provided the opportunity to eliminate the high cost TCS, with its 8 communications channels, from the MCS architecture. The TCT with the addition of a bubble memory (TCT w/B) has the same storage capacity as the TCS and will be procured in its place. A flexible network for connectivity within the MCS network will be obtained by utilizing four TCPs in conjunction with a TCT w/B, as shown at enclosure 1, and will provide the required 8 channel capacity.

4. The Army will limit military standard equipment to the training base and forward deployed and early deploying active component and roundout forces. By eliminating further procurement of the TCS, the Army is able to buy out the military standard equipment for seventeen active divisions in FY86, meeting the requirements for a militarized backbone. These divisions all deploy within the first 30 days of conflict. The military standard equipment will be supplemented with NDI equipment as shown at enclosure 2. The plan is to redistribute military standard and NDI equipment to the reserve component forces when active forces are re-equipped under the ACCS program.

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT CHIEF OF STAFF
FOR INFORMATION MANAGEMENT
WASHINGTON, D.C. 20310-0700

REPLY TO
ATTENTION OF

DAIM-AD

06 JUN 1986

SUBJECT: GAO Report on the Maneuver Control System

General Accounting Office
ATTN: Mr. Robinson
6063 GAO Bldg
441 G. Street, N.W.
Washington, DC 20548

1. This paper delineates the Army position regarding the issues raised by the General Accounting Office in the enclosed report and at the ARSTAF/GAO meeting on 23 May 1986. As outlined, the issues are four; the requirement for militarized computer equipment at Corps and Division Echelons, the number of active divisions that should receive militarized computer equipment, the need for formal operational testing prior to production, and the concern that the Army is investing in technically limited militarized equipment. Another issue raised by the GAO concerns overstated costs of $47.0M for NDI computer equipment in the MCS program. The Army concurs with GAO that the current cost estimate is $47.0M less than stated in the 5 March plan. The four former issues are the subject of this response.

a. The Requirement for Militarized Computer Equipment at Corps and Division Echelons.

The Army position is that militarized computer equipment, including both TCT and TCT with BMD, should be fielded at the Corps and Division echelons. The MCS system performs the critical functions at all echelons within the SIGMA concept; that is, it provides the commander the ability to maneuver the force. These functions are deemed absolutely essential to the Airland Battle concept and require full militarization. The "operational" sense of the Airland battle concept begins with the Corps Commander. The minimal Corps through Brigade fully militarized MCS system insures the essential functionality of command is protected. To remove this fully militarized equipment at Corps and Division would eliminate the hardness that is required for survivability. It would also force the heavy Divisional TAC CP out of tracked vehicles and into wheeled vehicles. This would obviously affect the Divisional environmental operational range and continuity of operations. The ACCS Hardness Requirement Analysis referenced

DAIM-AD
SUBJECT: GAO Report on the Maneuver Control System

in the enclosed report provides a general view of the battlefield, but also notes the criticality of the maneuver function. It is this essential maneuver function which demands full militarization.

b. Number of Active Divisions That Should Receive Militarized Computer Equipment.

The Army position is to field 17 active divisions with militarized computer equipment. While the Army maintains only five forward deployed active divisions, another 12 are considered "early deploying". The fact that six of the "early deploying" divisions are required to meet treaty commitments does not negate the fact that all 12 are required to deploy for operational reasons into the theaters as outlined in Congressional guidance. The 6th Infantry Division is not considered deployable within the limitations of the Congressional guidance. The need to field 17 divisions with militarized computer equipment is also driven by the fact that the Army considers MCS as a "go-to-war" system and not merely as a training vehicle for ACCS. A concern expressed at the GAO MCS briefing centered around the assumed excess of fully militarized equipment when ACCS is fielded; that is, how to move 17 Divisions of fully militarized hardware into 10 Reserve Component Divisions. It is the Army position that along with some attrition in equipment, there will be sufficient requirements at the EAC level along with separate brigades and ACRs to absorb the equipment. Another expressed concern centered on the provision of fully militarized equipment to Light Divisions despite the fact that there is no track environment to satisfy. It is important to note that the TCT is both smaller and lighter than the NDI portion of the MCS program. This "sizing" makes the fully militarized hardware even more appropriate for fielding in Light Divisions.

c. Need for Formal Operational Testing Prior to Production

The test program for MCS has been approved at every major milestone decision point. While in no sense the classical test program, it has been tailored to synchronize with the evolutionary approach used in developing the program. The TCT production approval at ASARC III in 1983 was based on 2 years of operational user evaluation in VII Corps. First Article Testing has been completed and, based on 3 years of production under the current contract, the FY 86 contract award represents the buy-out for the militarized part of the MCS program. The proposed testing for the NDI portion of the program was briefed and approved by the VCSA on 5 Feb 86 as part of the MCS Program Review. Recent and scheduled testing for both fully militarized and NDI hardware includes exercises at Ft Carson (June 86), and FOE1 in USAREUR in Spring 1987. FOE1 in VII Corps will determine when the TCT and TCT with BMD are fielded to the rest of the AC. The 1987 NDI production award is contingent upon successful testing at Ft Carson in

DAIM-AD
SUBJECT: GAO Report on the Maneuver Control System

June 1986 utilizing both TCT and TCP hardware. A formal Test and Evaluation Master Plan has currently been drafted with completion scheduled for Summer 1986. Finally, the Army will not fully field the Maneuver Control System until it completes a successful operational evaluation of a complete system. The scheduled test noted earlier is designed to that end.

d. Is the Army Investing in Technically Limited Militarized Equipment?

The Army position is that the TCT and the TCT with BMD are technically appropriate to satisfy their intended Army use. The 16 BIT processor and memories contained in both versions of the TCT are adequate to meet the MCS ROC requirement. The MCS in its hybrid of 16/32 processing capability will fully accommodate current and planned MCS requirements. The MCS is the "block one" or forerunner of the ACCS program. The Army's intent is to build upon the MCS experience and grow into "state-of-the-art" ACCS hardware/software.

2. It is hoped that the above information will prove helpful in formulating your final report on the Maneuver Control System. Please contact me if you require further information on MCS.

Encl

SAMUEL A. LEFFLER
Brigadier General, GS
Director, Architectural Design
and Control

(510156)

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